

ON THE OLFACTORY POWERS OF A NECROPHILOUS BEETLE.

BY CYRIL E. ABBOTT, Morgan Park, Ill.

Creophilus villosus Grav. furnishes almost ideal material for experimental work on olfaction. The beetles can be easily handled in small cages, and live for months in captivity, even breeding under such conditions.

MATERIALS AND METHODS

An experimental cage was made from a wooden box with internal dimensions of $18'' \times 11\frac{1}{2}'' \times 10\frac{1}{2}''$. Two partitions divided this into three chambers, each having a separate cover consisting of a wooden frame covered with wire screen. Each partition was perforated by three openings $1''$ in diameter, at the respective distances of $2''$, $4''$, and $6''$ from the end of the chamber; each set being placed at the opposite end of the central chamber from the other. The openings were $6\frac{1}{2}''$ from the floor of the cage, which was filled with sand to this depth in all chambers. Each end chamber contained a glass jar $5\frac{1}{2}''$ high and $2\frac{1}{2}''$ internal diameter, buried in the sand to its rim, and containing, one a damp cloth, the other about 1 oz. of decaying meat. Each jar was covered with paper, cross-cut nearly to the rim of the jar, but covered with enough sand to make it nearly invisible.

Experiments were conducted on two successive years (1934-35) during the month of May. Specimens taken in the morning were allowed to remain in the collecting jar until afternoon. They were removed singly; the antennae were "plucked" from every alternate specimen, and the wounds covered with shellac. (In a few cases, to be mentioned hereafter, the antennae were simply covered with shellac). Both normal and amputated specimens were counted, and a record kept of the number of each. In this way equal numbers of normal and of amputated specimens were obtained; extra specimens were held over for the following test.

Both normal and treated specimens were then placed in the central chamber of the experimental cage, the outlets to which had previously been closed with cork stoppers. About two hours later these plugs were removed.

Twenty-four hours later the plugs were replaced, any specimens running free in the end chambers were returned to the middle section, and the trap jars were removed. A record was then made of both amputated and normal specimens in each of the trap jars.

These specimens were then discarded. At the end of four days, after collecting the usual data, the sand was removed from all of the chambers, thoroughly mixed, and returned to the box, which, in the meantime, had been cleansed with warm water. The position of the trap jars was then reversed. Experiments then proceeded as before.

In 1935 certain specimens, instead of having the antennae removed, were treated by covering those organs with shellac. Since, however, it was necessary, in order to prevent the insects from removing the material, to amputate the anterior legs, it is unlikely that this method was more reliable than the other. For purposes of comparison, however, all results are given.

Besides the record of the number of beetles introduced into the cage, and the number taken from the traps, an attempt was made to account for those found in the sand of the end chambers. But this data probably had no value except to indicate the number of beetles that did not respond to the traps.

RESULTS

The results for amputated and for normal specimens were as follows:

| | Test jar | | Control jar | |
|------------------|---------------|-------|---------------|-------|
| | No. specimens | % | No. specimens | % |
| Normal | 125 | 51.25 | 116 | 47.56 |
| Amputated . . . | 51 | 37.74 | 83 | 61.41 |

The shellacked specimens gave the following results:

| Test jar | | Control jar | |
|---------------|---|---------------|-----|
| No. specimens | % | No. specimens | % |
| 0 | 0 | 25 | 100 |

(The significance of the peculiar results of shellacked specimens will be given in a later paper.)

INTERPRETATION

Disregarding the shellacked specimens, which behaved rather abnormally, there was a difference of 13.15% in favor of the normal specimens regarding the extent to which they were attracted to decaying animal matter. The difference in total response between normal and amputated specimens for the control trap amounted to 13.90% in favor of the normal specimens. The dif-

ference in responsiveness toward both traps between normal and amputated specimens was 62.66% in favor of the normal specimens.

Thus the amputation of antennae appeared to decrease the responsiveness of the beetles by nearly half. It is this reduction of activity which, in some cases, has doubtless been interpreted as a reduction of olfactory powers. On the other hand, this amputation does not otherwise affect the behavior of the beetles, since several amputated specimens were not only kept alive without difficulty four weeks, but also copulated and deposited fertile eggs. The large number of beetles taken in the control trap indicates that the *Creophilus* are attracted somewhat by moisture.

CONCLUSIONS

1. Experiment indicates that the antennae of *Creophilus villosus* Grav. are not exclusively olfactory in function.
2. Amputation of the antennae decreases the activity of this species almost by half.
3. The *Creophilus* are attracted to some extent by moisture.

"In your literature, you said there was a nip in the air after sundown," complained the summer boarder. Whereupon the proprietor of the hotel snickered, "Well, it's the truth, ain't it? Look at them mosquitoes."—*Newspaper*.